

Austin Avenue Radiation Site, Delaware County, Pennsylvania Preliminary Close Out Report (PCOR)

I. INTRODUCTION

This Preliminary Close Out Report documents that the U.S. Environmental Protection Agency (EPA) has completed all construction activities for the Austin Avenue Radiation Site in accordance with *Close Out Procedures for National Priorities List Sites* (OSWER Directive 9320.2-09A). EPA and the PADEP conducted twenty two final inspections on each of the twenty two affected properties between January 1997 and June 1999. Representatives from the U.S. Army Corps of Engineers and their remedial action contractor were present during all inspections. EPA notified Pennsylvania Department of Environmental Protection (PADEP) of the final inspection visits, the PADEP was unable to attend all final inspections. At each final inspection, it was determined that the remedial action had been successfully executed and that the remedy was constructed in accordance with the remedial design (RD) plans and specifications. EPA and the Commonwealth of Pennsylvania have initiated the activities necessary to achieve site completion and deletion.

II. SUMMARY OF SITE CONDITIONS

Background:

The Austin Avenue Radiation Superfund Site is located on and near thirty seven property parcels in Lansdowne Borough, Aldan Borough, East Lansdowne Borough, Darby Borough, and Upper Darby Township, Delaware County, Pennsylvania. These parcels are all within a two-mile radius of the former W. L. Cummings radium refining operation, which was located at the intersection of Austin and South Union Avenues in Lansdowne, PA. These properties were contaminated with radium and thorium-contaminated tailings generated by the Cummings' radium refining process which was in operation during the early 1900s.

Properties (OU1):

All property parcels associated with this operable unit have been contaminated with radium-226 and thorium 230 wastes except for the warehouse property which was also contaminated with uranium-238 wastes.

Twenty two (22) properties are addressed in this OU of the ROD. The parcels associated with the ROD's remedial action are noted with their area numbers, in parenthesis, as follows: Lansdowne Borough-216 Wayne Avenue (1); 218 Wayne Avenue (2); 219 Wayne Avenue (3); 237 N. Lansdowne Avenue (4); 6 East Plumstead Avenue (5); 10 East Plumstead Avenue (6); 16 East Plumstead Avenue (7); 42 South Union Avenue (8); 133 Austin Avenue (9); Warehouse property, site of the former radium refining facility at S. Union Ave and Austin Ave. (10); Upper Darby Township-500 Harper Avenue (11); 346 Owen Avenue (12); 310 Shadeland Avenue (13); 3723 Huey Avenue (14); Aldan Borough- 64 South Clifton Avenue (15) East Lansdowne Borough- 34 Lewis Avenue (16); 211 Penn Boulevard (17); 151 Lexington Avenue (18); Darby Borough- 617 Pine Street (19); 619 Pine Street (20); 621 Pine Street (21); 623 Pine Street (22). The remaining seventeen properties were addressed through removal actions.

Groundwater (OU2): In the spring of 1994, a study of site groundwater was conducted. EPA conducted a more extensive sampling of soils and groundwater in the vicinity of the former Cummings facility. A report on the study was finalized in the summer of 1995. On September 27, 1996, The Regional Administrator signed a Record of Decision (ROD) documenting a no action remedial action for Operable Unit 2 (OU2) site groundwater.

Site History:

During the early 1900s a professor from the University of Pennsylvania, developed a crystallization process for the refining of radium and set up his own business in his home basement. The W. L. Cummings Chemical Company (Cummings) located at Union and Austin Avenues in Lansdowne, Pennsylvania used his method to refine and process radium during the years 1915 to 1922. A by-product of the refining process was fine, well-graded sand like tailings. Approximately 3 grams of refined radium and 210 tons of tailings were generated during the facility's seven-year operating period. The tailings contained two residual radio nuclides, radium-226 (Ra226) and thorium-230 (Th230). Both Ra226 and Th230 are alpha radiation emitters and are considered a health hazard when inhaled or ingested.

In the late 1910's and early 1920's masonry and building contractors used the sand-like tailings from the Cummmings radium plant as aggregate for the following work activities: Laying mortar between brick and stone masonry, pointing mortar on stone or brick masonry, applying stucco on building exteriors, applying plaster to building interiors, and laying concrete for sidewalks and basement slabs on grade. The tailings were also used as fill under basement slabs, exterior perimeter foundation walls and other miscellaneous applications.

In 1986, the location of the contaminated tailings became an issue as the Government suspected that the tailings would contain residual radiation contamination but there were no records relating to the ultimate disposition of the tailings.

In May, 1991, the Pennsylvania Department of Environmental Resources, PADER, (now the Pennsylvania Department of Environmental Protection) visited the Austin/Union Avenue location in 1991 to monitor for radon because radiation contamination had previously been discovered in the back yard of 133 Austin Avenue, the property adjacent to the former Cummings facility property. During this visit, radiation instruments indicated the presence of significant levels of radioactive contamination at the site.

On June 7, 1991, PADER notified the USEPA of its findings during the visit and requested assistance. A joint PADER-USEPA site assessment confirmed the presence of radiological contamination at 133 Austin Avenue at levels that warranted immediate action. On June 19, 1991, a team of radiation specialists from the EPA National Air and Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama, conducted an assessment. The warehouse and the adjacent residential dwelling (133 Austin Avenue) were found to be heavily contaminated with radioactive materials. In November and December of 1991, EPA used a special radiation

detection van and conducted a 12.5 square mile survey in Delaware County and a small portion of the adjacent City of Philadelphia. EPA also conducted radiological surveys of the properties which were suspected to be contaminated. The EPA testing showed that thirty seven properties within a two mile radius of the site of the former Cummings radium processing facility have become contaminated with Ra226 and Th230.

EPA conducted CERCLA Removal Actions at seventeen of the properties. Removal actions were selected for those properties that posed an immediate endangerment and/or which could be addressed using removal authorities within the constraints of available funding. These removal actions included the temporary relocation of residents of several of the properties; complete dismantlement of the warehouse at South Union and Austin Avenues; dismantlement of the structure at 133 Austin Avenue; soil removals at a number of the properties; and removals of plaster, stucco, and concrete at selected properties. Removal actions were performed on affected properties during the period July 1991 through October 1995 at a total cost of \$22 million.

NPL Listing:

The EPA proposed the site to the National Priorities List (NPL) on February 7, 1992 (57FR4824) and added it to the final list on October 14, 1992 (57FR47180).

PRAP

The EPA issued a Proposed Remedial Action Plan (PRAP) on July 1, 1993 describing five possible remedial action alternatives for twenty-one of the parcels. The PRAP also designated EPA's preferred alternative for each of the properties. EPA requested comments on the PRAP and opened a public comment period. In response to that PRAP, EPA received numerous letters from citizens and public officials requesting that EPA reconsider its preferred alternatives for several of the parcels. EPA gathered additional information useful in the evaluation of remedial alternatives for the properties. Following consideration of the responses to the first PRAP, and of the above-described information, EPA issued, on March 2, 1994, a revised PRAP encompassing twenty-two parcels.

ROD and Remedial Action:

On June 27, 1994, Peter H. Kostmayer, Regional Administrator, EPA Region III, signed the Record of Decision selecting a remedial action for the site properties. The ROD contained an estimated cost for the remedial action ranging between \$36,642,250 to \$38,581,200.

The ROD included the following major components:

- The removal of contaminated components from the residential structure located at 346 Owen Avenue and the repair of the structure;
- The removal of contaminated structural components where practicable, or the complete dismantlement of residential structures on eighteen other properties followed by either repair of the structures, replacement of the structures on those properties, or relocation of

the residents to an offsite location. The property owners would select repair (where practicable), structure replacement, or offsite relocation after the ROD was issued. The United States would require title to each property where the residents had selected offsite relocation. At the end of the remedial action, title to each such property would be transferred to the Commonwealth of Pennsylvania;

- The dismantlement of an addition at the rear of 42 South Union Avenue and the repair of the building and the adjacent structure at 44 South Union Avenue;
- Temporary relocation of property residents during contamination removal and structural restoration or replacement. Building tenants would be relocated;
- Removal and offsite disposal of radiologically contaminated soils at permitted facilities;
- Offsite disposal of radioactive and demolition wastes at permitted facilities;
- Backfilling and re-vegetation of remediated properties;
- Replacement of the storage building that at one time was 135 Austin Avenue;
- Provision of an offsite structure or equivalent to replace the building formerly located at 133 Austin Avenue;
- Provision of institutional controls in those instances where soils cannot be removed to a level where the property is available for unrestricted use and unlimited access.

Remedial Construction Activities

In order to perform the remedial action outlined in the ROD, temporary and permanent residential relocations were necessary. The remedial action also included dismantlement, excavation, sampling and analysis, proper disposal of contaminated materials, residential reconstruction, and excavation of the source area at the warehouse property. The residential relocations, remedial design and remedial action were both funded and were performed through Interagency Agreements (IAGs) with the U. S. Army Corps of Engineers (USACE). The EPA and the Commonwealth of Pennsylvania entered into a State Superfund Contract on September 21, 1994. The remedial action was initiated on December 30, 1994 and the USACE awarded the remedial action contract on July 28, 1995, and on-site construction began October 25, 1995. *(This becomes the trigger date for the Five-Year Review.)*

Relocations:

The USACE Real Estate Division performed property acquisitions, temporary and permanent residential relocations for affected homeowners and tenants in accordance with Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. Chapter 61) (URA). Permanent relocations and title acquisitions were performed on the following properties: Darby

Borough- 617 Pine Street, 619 Pine Street, 621 Street, and 623 Pine Street; East Lansdowne Borough- 151 Lexington Avenue, 34 Lewis Avenue; Lansdowne Borough- 133 Austin Avenue; Upper Darby Township- 3723 Huey Avenue and 500 Harper Avenue. The USACE also permanently relocated tenants from the rental properties located at 218 Wayne Avenue Lansdowne Borough and 310 Shadeland Avenue Upper Darby Township.

The USACE performed temporary relocations of the homeowners selecting reconstruction these included: 237 N. Lansdowne Ave, 6, 10 and 16 E. Plumstead Avenue. 216, 218, and 219 Wayne Avenue Lansdowne Borough, 211 Penn Boulevard East Lansdowne Borough, and 64 S. Clifton Avenue Aldan Borough.

Remediation/Reconstruction:

On July 28, 1995, the U. S. Army Corps of Engineers, Baltimore District awarded Contract Number DACW-95-C-0092 to Severson Environmental Services of Niagara Falls, NY for \$13,685,414. On September 5, 1995, the U.S. Army Corps of Engineers, Baltimore District issued the Notice to Proceed to Severson Environmental Services to begin remedial action. On September 15, 1995, the U.S. Army Corps of Engineers, Kansas City District issued a Delivery Order to a Pre-placed contract to Envirocare of Utah Inc for the Disposal of the radiologically contaminated material (RCM).

The June 27, 1994 ROD indicated that affected homeowners, as appropriate, would be given the option to select between permanent off site relocation, or relocation back on site to their respective property, after the property has been remediated to cleanup goals, to a reconstructed residence. The following homeowners selected relocation back on site to a reconstructed property: Lansdowne Borough- 237 N. Lansdowne Ave, 6 E. Plumstead Ave. , 10 E. Plumstead Ave., 16 E. Plumstead Avenue, 216 Wayne Ave., 218 Wayne Ave., 219 Wayne Avenue; Aldan Borough - 64 S. Clifton; East Lansdowne Borough- 211 Penn boulevard East Lansdowne, PA.

Remedial Actions Performed:

The remedial actions performed at the Site include the cleanup of radiologically contaminated wastes from residential properties and their reconstruction and the excavation of contaminated soils from the warehouse property:

Residential Properties

Remedial activities included: 1) removal of RCM soil areas and structural materials from the houses, 2) removal of asbestos containing materials (ACM) from the houses, 3) demolition and removal of the non-contaminated portions of the house structure, 4) consolidation, packaging and shipment of RCM soil and debris to Envirocare for disposal and packaging and shipment of ACM for disposal, 5) consolidation, packaging and shipment of non RCM to local landfill for disposal, 6) independent post cleanup verification study for the property performed by Argonne National Laboratory (ANL), 7) reconstruction of residential dwelling to remedial design plans and specifications, 8) temporary and permanent residential relocations, and 9) excavation and disposal of radiologically contaminated soils from the warehouse property.

Soils Excavation at the Warehouse Property:

The warehouse property, approximately 120 ft x 110 ft, located at the corner of Union and Austin Avenues, was formerly occupied by the Cummings processing facility. The site included a portion of the adjacent railroad right-of-way, and is bordered to the East and South by South Union and Austin Avenues respectively. Contamination of the soil was not uniform and reached to a maximum depth of approximately 25 feet (at the SE corner).

The remedial action contractor performed soil removal at the site by dividing the site into halves. While excavators and radiation technicians worked one half of the site, removing contaminated soil (and stockpiling non-contaminated soil), laborers and radiation technicians worked the other half of the site loading, weighing, packaging and preparing the bulk bags for transportation off-site for proper disposal. Some contaminated soils extended beyond the limits of the warehouse property and under South Union and Austin Avenues. These soils were remediated by either removing portions of the paving or chasing the contamination into the sidewalk.

Excavation was necessary to depths of up to 18 feet adjacent to railroad tracks, the contractor was required to prepare a shoring system which would not only protect the integrity of the tracks, but other adjacent structures as well. The contract originally required a system using interlocking sheet piles and driven H-Piles. After considering the potential impact to the community, the USACE directed the contractor to redesign the shoring system to minimize installation noise and vibration.

Excavation of contaminated soils at the Warehouse property also included performance of the following activities: Preparatory and Initial Inspections, track protective services (flagman) during shoring installation along the rail line, pre-excavation activity structural inspections at all properties to include the city block adjacent to the warehouse property, location of existing utilities, vibration monitoring, air monitoring, dust control, adjustment of acceptable working hours, homeowner notification (meeting to discuss excavation shoring design), observation of tieback strength testing (to 125% of design load), designation of restricted areas during tieback testing, grout testing, and personnel safety monitoring.

Cleanup Levels:

The cleanup levels specified in the ROD are the following:

For soil, the cleanup criteria were established as 5.0 pCi/g (picocuries/gram) activity concentration of Ra226 in dry soil. The following criteria was used as a trigger mechanism to determine if cleanup to the 5.0 pCi/g criteria was required:

- 1) All soils in residential and potentially residential settings that have site-related Ra226 concentration more than 5.0 pCi/g (individual soil samples, including background).
- 2) For properties that were unlikely to become residential (i.e. streets, parks, railroad right-

of-way, etc.).

- a) Site-related Ra226 contamination more than 5.0 pCi/g (above background) in the top 15 centimeters, averaged over 100 square meters.
- b) Site-related Ra226 contamination more than 15 pCi/g (above background) in soils below 15 centimeters, averaged over 100 square meters.

During the demolition/ building dismantlement process, the following cleanup criteria was used: For building rubble and debris, the cleanup criteria were:

- a) 5.0 pCi/g activity concentration of Ra226 in dry rubble and debris.
- b) 20 disintegrations/minute per 100 square centimeters removable alpha surface contamination.
- c) 300 disintegrations/minute per 100 square centimeters total alpha surface contamination (removable plus fixed).

Any other material/ debris on the property debris that exceeded the above limits were also considered radioactive waste and disposed of properly.

During the remedial action, the USACE's remedial action contractor took continuous air monitoring samples, and implemented dust suppression measures to ensure that radiologically contaminated materials did not become airborne.

Total Quantity of Waste:

Summary of waste types generated and disposed:

Type of Waste	Quantity of Waste	Disposal Facility
Radiologically Contaminated Material (RCM) Debris	5951.44 tons	Envirocare, Clive UT
RCM Soils, all properties except warehouse	130,712.70 cubic feet,	Envirocare, Clive UT
RCM Soils, warehouse property	149,470.10 cubic feet	Envirocare, Clive UT
Asbestos Contaminated Materials (ACM)	1620 cubic feet	Grows Landfill Morrisville, PA
General Clean Debris	1910.18 tons	Grows Landfill Morrisville, PA

Final Inspection

The Austin Avenue site consisted of twenty two individual properties, and these sites were remediated and returned to their respective owners at different times over a two and a half year period, a number of separate final inspections were required. In all cases, the final inspection was conducted on each individual property at a point in time when the EPA and USACE determined that the final inspection was appropriate. In addition, in all cases, representatives from the EPA, Pennsylvania Department of Environmental Protection USACE, and the remedial action contractor, SES, were present. Others typically present included representative(s) of the homebuilder and the individual property owner(s). EPA notified Pennsylvania Department of Environmental Protection (PADEP) of the final inspection visits, the PADEP was unable to attend all final inspections. At each final inspection, it was determined that the remedial action had been successfully executed and that the remedy was constructed in accordance with the remedial design (RD) plans and specifications. The inspections were conducted during the period January 1997 through June 1999.

During the Final Inspections, the EPA, USCAE, PADEP personnel, along with the homeowner(s) and contractor's personnel, visited each room on each floor of the individual house pointing out defects or deficiencies in the workmanship to the contractor. The tour of the house interior was followed with a tour of the property to inspect such things as exterior finish and landscaping. All deficiencies, defects in workmanship, omissions from the drawings, etc. were pointed out to the contractor as they were identified. The contractor was required to compile the list of deficient items into a "punch list". The punch list was then used by the contractor as a working list and by the Government as a record-keeping device to insure that all observed deficiencies were adequately addressed by the contractor.

Once the Government determined that the punch list items had been sufficiently completed to allow the homeowner(s) to relocate back to their property, the homeowner(s) were notified by personnel from the USACE's Real Estate Division and arrangements were made for the relocation.

In regard to remediation at the warehouse property, the final inspection was conducted in November 1997 with EPA, USACE and their remedial action contractor. During this inspection, it was determined that the remedial action on the property had been successfully executed and that the remedy was constructed in accordance with the remedial design (RD) plans and specifications.

Following remedial activities and acceptance of the remedial action contractor sampling and compliance report for each individual property, an independent verification survey was conducted by Argonne National Laboratory. The primary objective of the independent survey was to provide independent verification that the remedial contractor decontaminated the individual properties such that they complied with the EPA cleanup criterion for Ra226 in soil and that the property is suitable for unrestricted use

A 'Warranty of Construction Clause' included in the contract required the remedial action contractor to warrant all work performed for one year after final acceptance. Since the final inspections were held on a property-by-property basis, individual warranties will expire at various times. For those properties where a new home was not rebuilt, the contractor was required to maintain the appearance of the property (i.e. cutting the grass) until the contract expired.

Remaining Activities:

Remaining activities to be completed by the EPA include the placement of deed notice/restrictions on the following parcels: 1) 133 Austin Avenue property where excavation of "hot spots" at the depth of twenty six feet and in areas beyond the limits of practicable excavation, and 2) a portion of the warehouse property immediately adjacent to the railroad tracks where excavation would have potentially impacted the railroad track bed.

III. DEMONSTRATION OF CLEANUP ACTIVITY QUALITY ASSURANCE AND QUALITY CONTROL

Activities at the site were consistent with the ROD and RD, and the RA statement of work issued to the contractor for design and construction. The RD included a Quality Assurance Project Plan (QAPP), incorporating all EPA and State quality assurance and quality control (QA/QC) procedures and protocol. EPA analytical methods were used as appropriate for all validation and monitoring samples during RA activities.

The RD Report, including a Quality Assurance Project Plan, incorporated all EPA and State quality assurance and quality control (QA/QC) procedures and protocol. EPA analytical methods were used for all validation and monitoring samples during RA activities. Sampling of soil, sediments, and water followed the EPA protocol *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods*. The USACE's contractor project close out report dated 5/20/98 and the Argonne National Laboratory Post Verification reports contain documentation of all sampling results.

The QA/QC program used throughout the RA was rigorous in conformance with EPA and State standards; therefore, EPA and the State determined that all analytical results are accurate to the degree needed to assure satisfactory execution of the RA and are consistent with the ROD and RD plans and specifications.

IV. ACTIVITIES AND SCHEDULE FOR SITE COMPLETION

The following activities will be completed according to the following schedule:


TASK	Estimated Completion	Responsible Organization
Approve Final RA Close Out Report	12/31/99	EPA/ Commonwealth of Pennsylvania
Implement Deed Restrictions / Deed Notice	3/31/00	EPA/ Commonwealth of Pennsylvania
Final Close Out Report	4/30/00	EPA
Delete From NPL	6/30/00	EPA
Five Year Review	10/25/00	EPA

V. SUMMARY OF REMEDIATION COSTS

The original cost estimate to implement the remedial action described in the ROD was estimated between \$36,642,250 to \$38,581,200. The remedial design was performed by the U.S. Army Corps of Engineers (USACE) under an Interagency Agreement for \$1,150,000. USACE Real Estate Division specialists performed the property acquisitions and relocation through Interagency agreements totaling to date: \$1,891,365. The U.S. Army USACE awarded the construction contract for \$13,685,414 on July 28, 1995. As of the time of writing this PCOR, total costs for contract modification due to construction requirements and a change in the shoring system associated with the excavation at the warehouse property and the need for de-watering system at that property increased construction costs an additional \$402,051. Total costs associated with the site remedial activity is \$17,128,830.

VI. FIVE-YEAR REVIEW

Upon completion of this remedy, hazardous substances will remain on-site above levels that prevent unlimited use an unrestricted exposure on two of the properties this waste was outside the area limits of excavation. Pursuant to CERCLA Section 121(c) and as provided in OSWER Directive 9355.7-02, *Structure and Components of Five-Year Reviews*, May 23, 1991, and OSWER Directive 9355.702A, *Supplemental Five-Year Review Guidance*, July 26, 1994, EPA must conduct a five-year review. Therefore, the Five-Year review will be completed prior to October 25, 2000 (five years after the date of the actual RA onsite construction).


Abraham Ferdas, Director
Hazardous Site Cleanup Division

9/27/99
Date